UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION 8

Subject:	**POLREP #1 (Initial Pollution Report)** **Gold King Mine Site** **Site #085M** **Silverton, CO** **Latitude: 37.8945 Longitude: -107.6384**
To:	Laura Williams, Response Unit Chief David Ostrander, Program Director
From:	Steven Way, On-Scene Coordinator
Date:	September 25, 2014
Reporting Period:	August to September 2014

1 INTRODUCTION

1.1 Background

Site Number:	085M	**Contract Number:**	
D.O. Number:		**Action Memo Date:**	
Response Authority:	CERCLA	**Response Type:**	Time-Critical
Response Lead:	EPA	**Incident Category:**	Removal Assessment
NPL Status:	Non-NPL	**Operable Unit:**	OU 3
Mobilization Date:	8/11/2014	**Start Date:**	9/3/2013
Demob Date:		**Completion Date:**	
CERCLIS ID:		**RCRIS ID:**	
ERNS No.:		**State Notification:**	
FPN#:		**Reimbursable Account #:**	

1.1.1 Incident Category

CERCLA Removal Assessment

1.1.2 Site Description

The Gold King Mine is located within the Cement Creek watershed, a component of the upper Animas River watershed in San Juan County, Colorado. These watersheds within the volcanic terrain of the San Juan Mountains were the focus of both large and small scale mining operations that flourished beginning in 1871 and lasted until as late as 1991. Several other mines in the Cement Creek basin also have draining adits. The flow from the Red and Bonita Mine, the Gold King (Level 7) Mine, and the Mogul Mine all experienced significant increases in flow following the plugging of the American Tunnel that began in 1995. Water quality in the Animas River has been degraded progressively since that time.

Three portal areas are associated with the Gold King Mine: the Level 7, Number 1, and Samson portals. In the 1980s a bypass adit (new portal) was driven at Level 7 to bypass a collapse in the original tunnel. All four portals were dry until after the American Tunnel was bulkheaded in 1995.

In 2007 the mine drainage from the Level 7 portal breached the existing ditch and saturated the top of the Level 7 waste rock pile, leading to a slope failure. In 2008, the State of Colorado Division of Reclamation, Mining, and Safety (DRMS) moved the ditch, directing water toward the east face of the waste rock pile, and lined it with half round high density polyethylene (HDPE) pipe. In 2009 both the old and new Level 7 portals, which had been partially collapsed, were backfilled by DRMS. An observation pipe and a drainage pipe were installed in the old portal, but during closure the timbers in the portal collapsed, burying the pipes. The drainage pipe continued to drain at roughly 200 gallons per minute (gpm), the same flow rate as was observed prior to the collapse. Also in 2009, a concrete ditch was installed to receive discharge from the old portal and a 3-inch Parshall flume was installed between the concrete ditch and half round HDPE pipe.

Discharge from the old portal flows from the discharge pipe into the cement culvert, through the flume, into the half round HDPE pipe, down the east face of the waste rock pile, and into the North Fork of Cement Creek. Intermittent discharges from the new portal flow through a small channel and over the site access road. North Fork Cement Creek joins with the main stem of Cement Creek downstream of the Red and Bonita Mine.

The Animas River and many of its tributaries, including Cement Creek, carry high concentrations of metals from both acid rock/mine drainage at mine sites and from natural sources not impacted by mining. Water quality studies have indicated that the Gold King Mine is one of the major sources of metals to the Animas River near Silverton. The EPA, Bureau of Land Management (BLM) and U.S. Geological Survey (USGS) have undertaken activities to more fully quantify the various mine site sources and to quantify defuse metals sources within the mine district that contribute to the metals loads in the Animas River. These actions are intended to contribute to the information needed to identify potential remedies to reduce or prevent the on-going hazardous substance (metals) releases from the mine sites.

1.1.2.1 Location

The Gold King Mine Site is located in San Juan County, Colorado. The portal is approximately 9 miles north of the town of Silverton, Colorado, at 11,386 feet above mean sea level. Road access is via County Road (CR) 110 from the town of Silverton to CR53 at the abandoned town site of Gladstone. CR53 continues northward up the Cement Creek valley to CR51, which continues up to the mine site, approximately 0.75 mile northeast of Gladstone.

The Gold King Level 7 is located above a steep south-facing waste dump that borders on North Fork Cement Creek. The mine is accessible during non-snow months of the year, typically late June through early October. The site is seasonally inaccessible due to snow and extreme weather conditions. The mine is on steep terrain that creates limiting conditions for operations.

1.1.2.2 Description of Threat

The mine drainage and collapse at Level 7 is a continuing concern as it may indicate the potential for an unstable increase in mine pool head within the Gold King workings.

Since 2009, discharge rates from the Gold King Level 7 adit have been observed to range from 112 to 252 gpm. The discharge water pH ranged from 2.3 to 5.1 standard units. Discharge from the Gold King 7 Level adit contains high concentrations of cadmium (36.1 micrograms per liter (µg/L) to138 µg/L), copper (2450 µg/L to12100 µg/L), aluminum (7200 µg/L to 60000 µg/L), iron (46,700 µg/L to 257,000 µg/L), manganese (23,500 µg/L to 34,200 µg/L), and zinc (13,000 µg/L to 41,900 µg/L) (concentrations measured from 2009 through 2014). The discharge from the adit represents a significant release of the heavy metals to the Animas River.

The results of a Screening Level Ecological Risk Assessment (February 2013) strongly suggested that the fish community in the Animas River at and below Silverton would experience high stress under current conditions. For example, the surface water hazard quotient for zinc in the Animas River below the confluence with Cement Creek is approximately 4, which is four times the expected no-effects level. In addition, the study identified aluminum, copper, lead, and zinc as the major risk drivers to insectivorous birds ingesting surface water, sediment, and aquatic invertebrates from the Animas River at and below Silverton. Metal concentrations measured in the substrate of the Animas River at and below Silverton were expected to be highly toxic to benthic invertebrates. Recent fish population studies conducted by the Colorado Division of Wildlife found no fish in the Animas River below Cement Creek for approximately 2 miles.

1.1.3 Preliminary Removal Assessment/Removal Site Inspection Results

In an effort to characterize the hazardous substance releases in the watershed, the surface water and mine adit discharges were sampled by EPA several times during the year over several years. It is now sampled two times each year (spring and fall) at established locations for water quality parameters, flow volume, and total and dissolved metals in Cement Creek and the Animas River by the EPA Environmental Services Assistance Team (ESAT). ESAT also performs laboratory analysis and data reporting to the SCRIBE network.

Mine Adit Discharge 2005 to 2011

Mine	Elevation (feet AMSL)	Bulkhead Install	Flow Rate (gpm)				
			July 2005	September 2005	October 2006	Average 2010	Average 2011
Gold King	11,386	None	42	135	314	206	140

gpm – Gallons per minute. AMSL – Above mean sea level.

2 CURRENT ACTIVITIES

2.1 Operations Section

2.1.1 Narrative

Water flowing from the Gold King Level 7 adit has very low pH and elevated metals concentrations. The mine is currently inaccessible due to a blockage at the old and new portals. Initial work is needed to expose the adit behind the blockage, build a portal structure, and ensure water flows into the existing channel. Subsequent work will include entering and investigating the adit to identify actions that may be performed to reduce the potential for uncontrolled releases of water from the mine or improve the quality of water released from the mine and thus reduce contaminant loading to North Fork Cement Creek and downstream waters.

2.1.2 Response Actions to Date

- A retention pond was constructed in August and September 2014 at the base of the southeast corner of the waste dump to capture solids that might be released during the portal excavation, rehabilitation, and initial mine entries. The underlying ground is very porous so the pond was lined with geo-fabric to prevent release of solids through the subsurface to North Fork Cement Creek. A system was set up along the water channel outside the Gold King Level 7 adit to allow addition of sodium hydroxide and flocculant to the adit discharge to enhance solids settling in the pond.

- On September 11, 2014 work began to reopen the portal from the existing adit. After only two hours of excavation, adit drainage issues developed which limited access to the portal. Work was temporarily suspended and the site was inspected by EPA OSC Way, DRMS, ERRS, and START. It was determined that adit drainage would need to be better channelized before work could continue on the portal excavation.
- The following day, additional drainage components were installed at the Gold King Level 7 Mine portal. Pooled adit drainage water was pumped into the existing channel so that the excavation area could be dewatered to facilitate additional excavation. A section was removed from the concrete channel north wall (approximately 26 inches by 10 inches) to allow for construction. Two 12-inch diameter polyvinyl chloride (PVC) pipes were installed to better direct adit drainage water from the portal into the concrete channel. Geo-fabric, crushed rock, and quick-dry concrete was used to secure the pipes in place. The portal area was backfilled and compacted with additional loads of crushed rock to maintain a stable surface at the portal for potential future work.
- Portal excavation was only completed for approximately 20 feet in from the adit gate. Collapsed rock continues to seal the mine portal, with adit piping partially visible. Due to seasonal weather limitations at high altitude, no further work at the Gold King Mine was scheduled for the rest of this year.
- During the week of August 25, 2014, flow from the Gold King Mine through the flume was approximately 112 gpm. On September 11, prior to any Site work, the flow from the old portal was less than 12.6 gpm and flow from the new portal west of the primary discharge point was less than 5 gpm. The reason for reduced discharge is unknown.

2.2 Planning Section

2.2.1 Anticipated Activities

In 2015, additional work to reopen the portal will be performed. The water management system to be operated during the mine entry will be designed during the winter. Installation of the temporary system will occur prior to entry anticipated for July 2015. Based on previous activities, it is estimated that the work may require four weeks to be completed, including the set up time for the water management system.

2.2.2 Issues

Adit drainage will need to be closely monitored during any future excavation work. Drainage will need to continue to be directed into the channel so it can be transported to the water treatment area on site. Future excavation of the portal may require shoring or removing additional slope face material to prevent rock collapse. The limited access to area and limited space for equipment on site presents additional challenges to the operation.

2.3 Logistics Section

No information available at this time.

2.4 Finance Section

No information available at this time.

2.5 Other Command Staff

2.5.1 Community Involvement

The Animas River Stakeholders Group is actively involved with the work in the watershed and is routinely briefed on the work at the Red and Bonita Mine. The group was formed to improve water

quality and habitats in the Animas River through a collaborative process designed to encourage participation from all interested parties. Participants include mining companies, citizens, environmental organizations, land owners, local governmental entities, and state and federal regulatory and land management agencies. Regular meetings are held with the participants.

3 Participating Entities

DRMS, Animas River Stakeholder Group (ARSG), Bureau of Land Management (BLM)

4 Resources On Site

The following is a partial list of organizations that participated in performing work at the site for these activities:

- Environmental Protection Agency:
- DRMS
- BLM
- EPA Superfund Technical Assessment and Response Team (START)
- EPA Emergency and Rapid Response Services (ERRS) Contractor
- EPA Environmental Services Assistance Team (ESAT)

5 Additional Sources of Information

Animas River Stakeholder Group website: http://www.animasriverstakeholdersgroup.org/

EPA OSC website: http://www.epaosc.org/site/region_list.aspx?region=8